USAE Waterways Experiment Station
6 June 1973



Progress Report on ERTS Project 281

a. Title of Investigation

Sediment Pattern Correlation with Inflow and Tidal Action, Proposal No. MMC 281.

b. Principal Investigator

Warren E. Grabau, GSFC ID DE328

c. Problems

Inclement weather in the Chesapeake Bay Study Area (CBSA) prevented obtaining ground truth and satellite data on 21 March and 8 and 26 April 1973 as planned.

Data collected in the Choptank and Rappahannock Rivers with data collection platforms (DCP's) connected to water quality analyzers for monitoring temperature, conductivity, pH, and dissolved oxygen are questionable due to erratic operation of the DCP's. NASA/Wallops Station reported that this problem was probably the result of moisture in the DCP's.

Thus far, $I^2S$ and color IR imagery taken on 10 October 1972 is the only low altitude coverage of the CBSA that coincides with both an ERTS-1 overpass and ground truth data collection. No other coverage coincides in time with collection of ground truth data. Therefore, the results of photo interpretations of water patterns on the basis of tone, texture, and geometry cannot be validated.

d. Work Accomplished 1 March - 30 April 1973

Data recorded on computer compatible tapes (CCT's) for two scenes (1079-15133 and 1079-15140) were reduced to radiometric terms, and analysis was initiated on portions of the taped data related to the C&D Canal and the Choptank, Wicomico, Rappahannock, and York Rivers.

Development of a computer program was started to decode the data tapes produced by the Bendix 24-channel scanner and reformat the data on a new tape for processing with the computer program currently being used for spectrum matching with ERTS data.



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In addition, a computer program was written to register the four frames taken simultaneously with the $I^2S$ camera. The input to this program is a set of digital tapes produced by scanning the $I^2S$ images with a microdensitometer already on hand. This program permits the $I^2S$ imagery to be converted to a form suitable for analysis with existing spectrum matching programs.

Work contemplated 1 May - 30 June 1973

Analysis of ERTS data to determine correlations with ground truth data will be continued.

Other CCT's of the CBSA will be processed, and the results will be analyzed.

The computer program to decode the 24-channel scanner tapes will be completed and used to analyze data on hand for the CBSA. $I^2S$ imagery of the CBSA will be analyzed.

e. Significant Results

At the time the two scenes of the CBSA were taken, ground truth data were taken at a number of stations within each of the test areas. Where local conditions permitted, either all or a part of the following parameters were measured: water temperature, conductivity, turbidity, dissolved oxygen, current velocity, spectral transmittance, and pH. In addition, a sample of water was taken at each location and the concentration of suspended material in each sample was determined.

In the analysis the relationship of each measured parameter and the corresponding radiance values (reflectance spectrum) detected by the ERTS was evaluated. Thus far, the analysis has shown a good correlation with concentrations of suspended material contained in the water. Consider, as an example, data for the York River. Ground truth data were taken at thirteen of the stations shown in fig. 1. Stations 14-18 were not sampled due to local high wave conditions. The radiance values corresponding to these locations were plotted as a function of material concentrations. Results are shown in fig. 2 with regression lines and the confidence bands of the ERTS data (± 2% of maximum detectable radiance) drawn for MSS bands 4, 5, and 6. All points fall within or almost within the confidence bands except the points corresponding to ground truth data collection stations 2, 9, and 13. Radiance values at these points appear to be members of a different population and may be affected by something other than concentration of suspended material, or the suspended material at these stations may have reflectance properties different from those of the remainder of the populations.

f. Published Articles, Papers, Reports, Talks

None.

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IN REPLY REFER TO: WESFV

6 June 1973

SUBJECT: Transmittal of Progress Report

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We are inclosing our report of progress on ERTS Project 281 for the period 1 March - 30 April 1973.

FOR THE DIRECTOR:

F. R. Brown

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as

F. R. BROWN
Engineer
Technical Director

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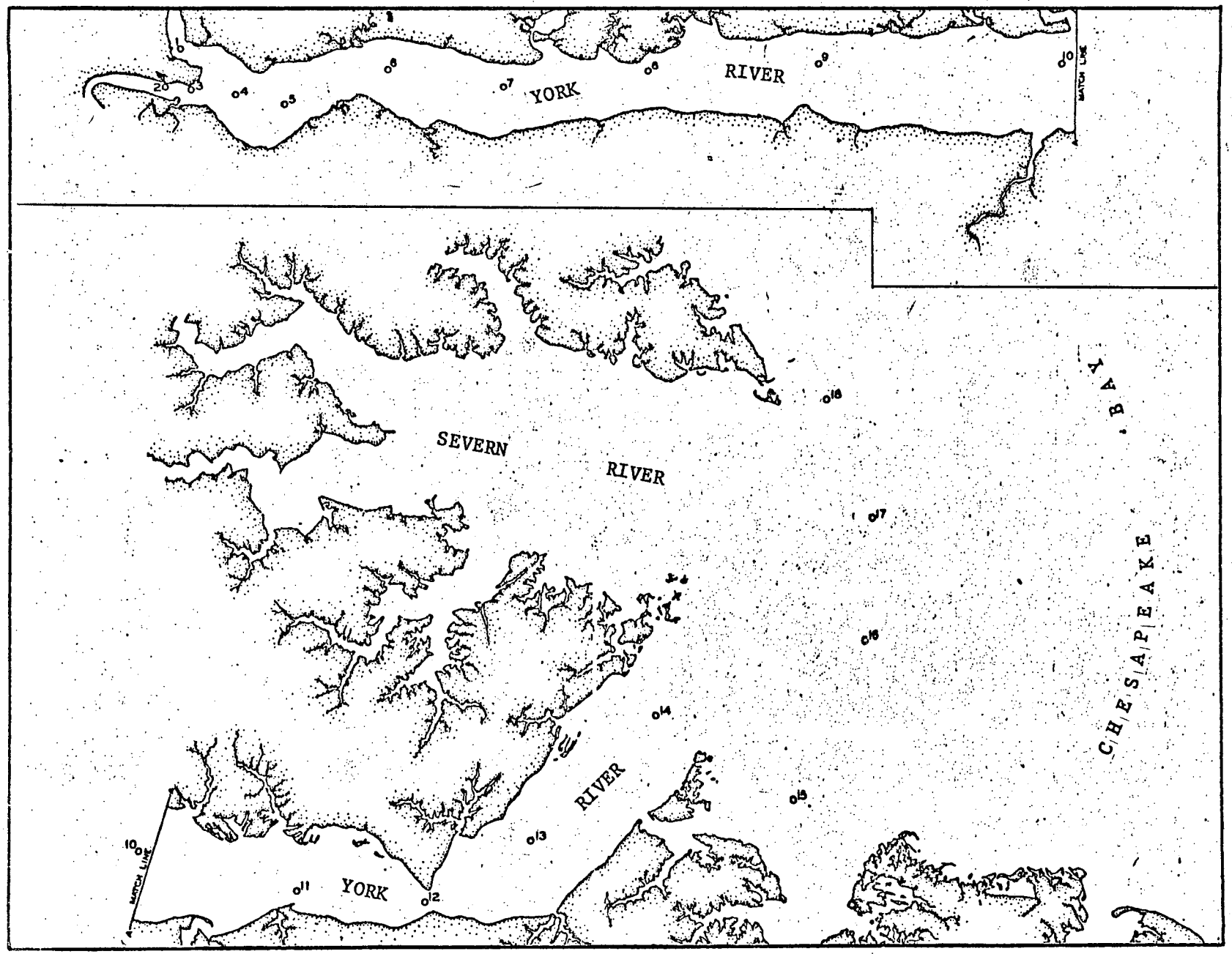


Fig. 1. Location of ground truth data collection stations in the York River

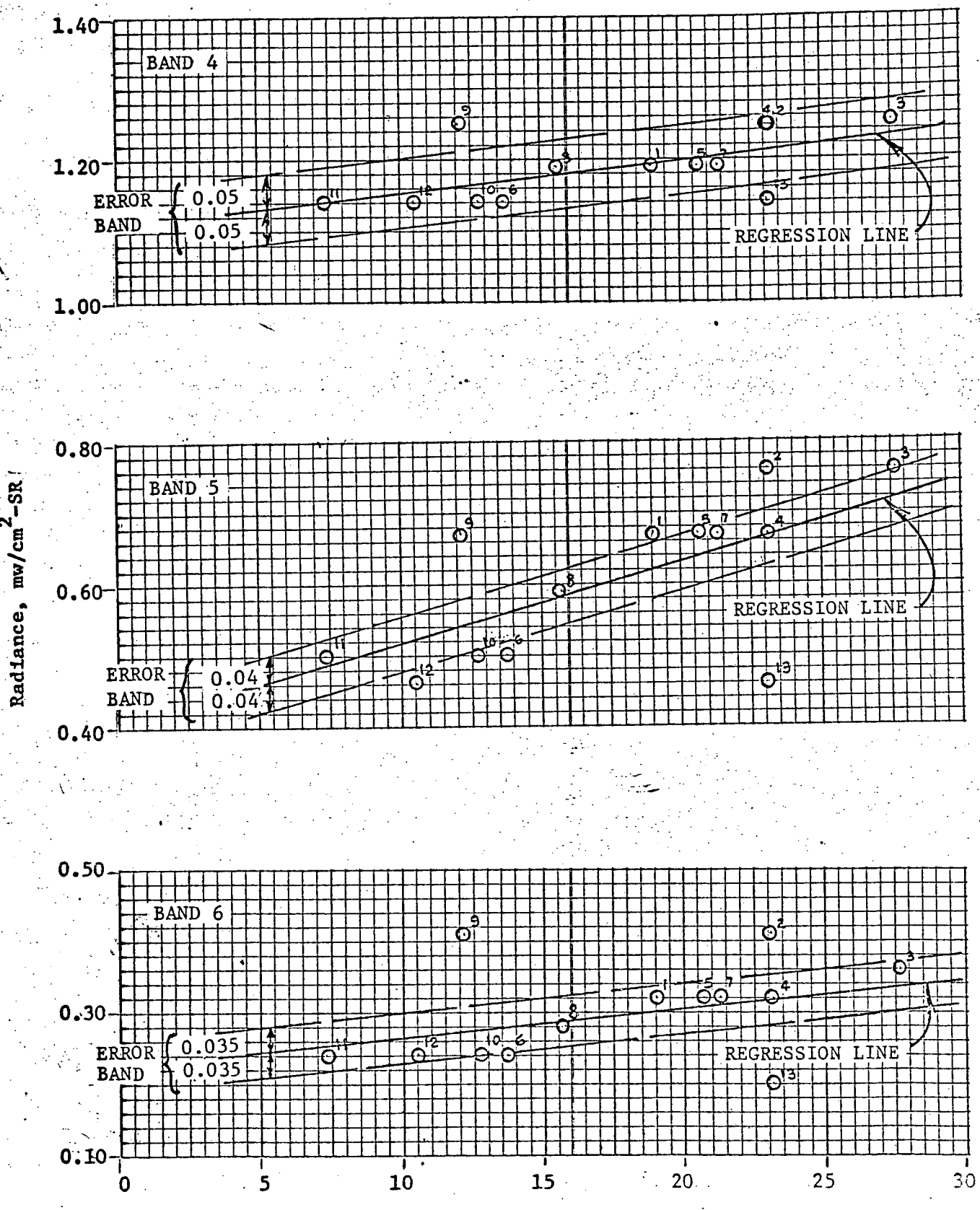


Fig. 2. Radiance versus suspended material concentration-York River